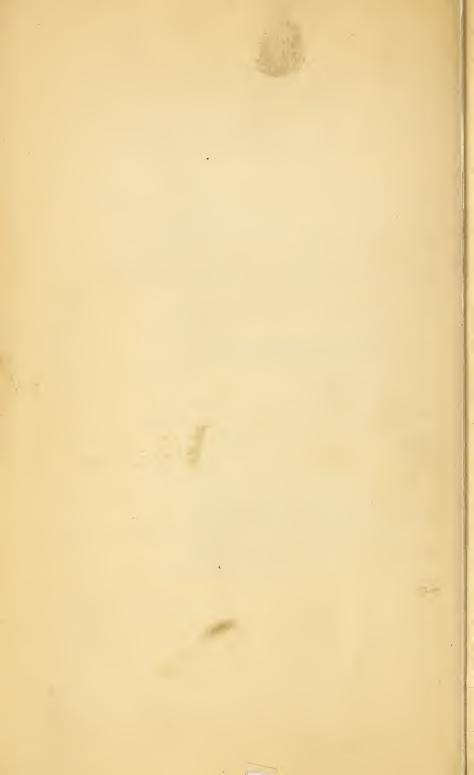
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United States Department of Agriculture,

OFFICE OF THE SECRETARY.—Circular No. 10.

STANDARDS OF PURITY FOR FOOD PRODUCTS.

Whereas, The Congress of the United States by an act approved June 3, 1902, authorized the Secretary of Agriculture to establish standards of purity for food products; and

Whereas, He was empowered by this act to consult with the Committee on Food Standards of the Association of Official Agricultural Chemists and other experts in determining these standards; and

Whereas, He has in accordance with the provisions of the act availed himself of the counsel and advice of these experts and of the trade interests touching the products for which standards have been determined and has reached certain conclusions based on the general principles of examination and conduct hereinafter mentioned;

Therefore, I, James Wilson, Secretary of Agriculture, do hereby proclaim and establish the following standards for purity of food products together with their precedent definitions as the official standards of these food products for the United States of America.

JAMES WILSON.

Washington, D. C., November 20, 1903.

UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF CHEMISTRY,

WASHINGTON, D. C.

To the Honorable The Secretary of Agriculture of the United States.

SIR: The undersigned, representing The Association of Official Agricultural Chemists of the United States, and commissioned by you, under authority given by the Act of Congress, approved March 3, 1903, to collaborate with you "to establish standards of purity for food products and to determine what are regarded as adulterations therein, for the guidance of the officials of the various States and of the Courts of Justice," respectfully submit herewith, for your consideration, standards for certain articles belonging to the schedules of meat and the principal meat products, milk and its products, sugars and related substances, and condiments and cocoa and cocoa products, with the recommendation that they be approved and proclaimed the established standards.

In connection therewith are presented a classified list of the various schedules of food products for which standards are being prepared and a statement of some of the more important general principles upon which the standards are based.

Before the adoption of any schedule it was submitted to the manufacturing firms and the trade immediately interested for criticisms, and, when requested by them, conferences for discussion have been arranged. Certain questions have arisen in the discussion of these standards relative to several substances sometimes used as preservatives or coloring matters. In the judgment of the committee these questions can most satisfactorily be treated in connection with Schedule III, Preservatives and Coloring Matters, and recommendations have therefore been deferred pending the consideration of that schedule.

For the primary definitions and standards and for the compilations of data for standards and constant assistance in the revision of the schedules the committee is greatly indebted to the following persons: Charles D. Woods, Ph. D., director of the Maine Agricultural Experiment Station, Orono, Me., referee on meat and its products; L. L. Van Slyke, Ph. D., chemist of the New York Agricultural Experiment Station, Geneva, N. Y., referee on milk and its products; Charles A. Crampton, M. D., chemist of the Bureau of Internal Revenue, referee on beverages, including cocoa and cocoa products; A. L. Winton, Ph. B., chemist of the Connecticut Agricultural Experiment Station, New Haven, Conn., referee on condiments.

The committee is also indebted to others for information and helpful suggestions, which will be more specifically acknowledged in a report of its work to be later submitted.

Very respectfully,

WILLIAM FREAR, EDWARD H. JENKINS, MELVILL A. SCOVELL, HENRY A. WEBER, HARVEY W. WILEY.

PRINCIPLES ON WHICH THE DEFINITIONS AND STANDARDS ARE BASED.

The general considerations which have guided the committee in preparing the definitions and standards for food products are the following:

- 1. The main classes of food articles are defined before the subordinate classes are considered.
- 2. The names of the various substances for which standards are proposed are defined.
- 3. The definitions are so framed as to exclude from the articles defined substances not included in the definitions.
- 4. The definitions include, where possible, those qualities which make the articles described wholesome for human food.
- 5. A term defined in any of the several schedules has the same meaning wherever else it is used in this report.
- 6. The names of food products herein defined usually agree with existing American trade or manufacturing usage, but where such usage is not clearly established or where trade names confuse two or more articles for which specific designations are desirable, preference is given to one of the several trade names applied.
- 7. Standards are based upon data representing materials produced under American conditions and manufactured by American processes or representing such varieties of foreign articles as are chiefly imported for American use.
- 8. The standards fixed are such that a departure of the articles to which they apply, above the maximum or below the minimum limit prescribed is evidence that such articles are of inferior or abnormal quality.
- 9. The limits fixed as standard are not necessarily the extremes authentically recorded for the article in question, because such extremes are commonly due to abnormal conditions of production and are usually accompanied by marks of inferiority or abnormality readily perceived by the producer or manufacturer.

FOOD DEFINITIONS AND STANDARDS.

I. ANIMAL PRODUCTS.

A. MEATS AND THE PRINCIPAL MEAT PRODUCTS.

a. MEATS.

Definitions.

- 1. Meat is any sound, dressed, and properly prepared edible part of animals in good health at the time of slaughter. The term "animals," as herein used, includes not only mammals, but fish, fowl, crustaceans, mollusks, and all other animals used as food.
- 2. Fresh meat is meat from animals recently slaughtered or preserved only by refrigeration.
- 3. Salted, pickled, and smoked meats are unmixed meats preserved by salt, sugar, vinegar, spices, or smoke, singly or in combination, whether in bulk or in packages.

Standard.

Standard meat, fresh meat, and salted, pickled, and smoked meats are such as conform respectively to the foregoing definitions.

b. MANUFACTURED MEATS.

Definition.

1. Manufactured meats are meats not included in definitions 2 and 3, whether simple or mixed, whole or comminuted, in bulk or packages, with or without the addition of salt, sugar, vinegar, spices, smoke, oils, or rendered fat.

Standard.

Standard manufactured meats conform to the foregoing definition. If they bear names descriptive of composition they correspond thereto and when bearing such descriptive names, if force or flavoring meats are used, the kind and quantity thereof are made known.

C. MEAT EXTRACTS, MEAT PEPTONES, ETC.

(Schedule in preparation.)

d. LARD.

Definitions.

- 1. Lard is the rendered fresh fat from slaughtered, healthy hogs.
- 2. Leaf lard is the lard rendered at moderately high temperatures from the internal fat of the abdomen of the hog, excluding that adherent to the intestines.

Standard.

Standard lard and standard leaf lard are lard and leaf lard respectively, free from rancidity, containing not more than one (1) per cent of substances, other than fatty acids, not fat, necessarily incorporated therewith in the process of rendering, and standard leaf lard has an iodine number not greater than sixty (60).

Definition.

3. Neutral lard is lard rendered at low temperatures.

B. MILK AND ITS PRODUCTS.

a. MILKS.

Definition.

1. Milk (whole milk) is the lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within fifteen days before and five days after calving.

Standard.

Standard milk is milk containing not less than twelve (12) per cent of total solids and not less than eight and one-half (8.5) per cent of solids not fat, nor less than three and one-quarter (3.25) per cent of milk fat.

Definitions.

- 2. Blended milk is milk modified in its composition so as to have a definite and stated percentage of one or more of its constituents.
 - 3. Skim milk is milk from which a part or all of the cream has been removed.

Standard.

Standard skim milk is skim milk containing not less than nine and one-quarter (9.25) per cent of milk solids.

- 4. Buttermilk is the product that remains when butter is removed from milk or cream in the process of churning.
- 5. Pasteurized milk is standard milk that has been heated below boiling but sufficiently to kill most of the active organisms present and immediately cooled to fifty degrees (50°) Fahr. or lower to retard the development of their spores.
- 6. Sterilized milk is standard milk that has been heated at the temperature of boiling water or higher for a length of time sufficient to kill all organisms present.
- 7. Condensed milk is milk from which a considerable portion of water has been evaporated.
- 8. Sweetened condensed milk is milk from which a considerable portion of water has been evaporated and to which sugar (sucrose) has been added.

Standard.

Standard condensed milk and standard sweetened condensed milk are condensed milk and sweetened condensed milk, respectively, containing not less than twenty-eight (28) per cent of milk solids, of which not less than one-fourth is milk fat.

9. Condensed skim milk is skim milk from which a considerable portion of water has been evaporated.

b. MILK FAT OR BUTTER FAT.

Definition.

1. Milk fat or butter fat is the fat of milk.

Standard.

Standard milk fat or butter fat has a Reichert-Meissl number not less than twenty-four (24) and a specific gravity not less than 0.905 (40° C. /40° C.).

c. CREAM.

Definition.

1. Cream is that portion of milk, rich in butter fat, which rises to the surface of milk on standing, or is separated from it by centrifugal force.

Standard.

Standard cream is cream containing not less than eighteen (18) per cent of milk fat.

2. Evaporated cream is cream from which a considerable portion of water has been evaporated.

d. BUTTER.

Definition.

1. Butter is the product obtained by gathering in any manner the fat of fresh or ripened milk or cream into a mass, which also contains a small portion of the other milk constituents, with or without salt. By acts of Congress approved August 2d, 1886, and May 9th, 1902, butter may also contain additional coloring matter.

Standard.

Standard butter is butter containing not less than eighty-two and five-tenths (82.5) per cent of butter fat.

Definition.

2. Renovated or process butter is the product obtained by melting butter and reworking, without the addition or use of chemicals or any substances except milk, cream, or salt.

Standard.

Standard renovated or process butter is renovated or process butter containing not more than sixteen (16) per cent of water and at least eighty-two and five-tenths (82.5) per cent of butter fat.

e. CHEESE.

Definitions.

- 1. Cheese is the solid and ripened product obtained by coagulating the casein of milk by means of rennet or acids, with or without the addition of ripening ferments and seasoning. By act of Congress, approved June 6, 1896, cheese may also contain additional coloring matter.
- 2. Whole milk or full cream cheese is cheese made from milk from which no portion of the fat has been removed.
- 3. Skim-milk cheese is cheese made from milk from which any portion of the fat has been removed.
- 3. Cream cheese is cheese made from milk and cream, or milk containing not less than six (6) per cent of fat.

Standard.

Standard whole-milk cheese or full-cream cheese is whole-milk or full-cream cheese containing in the water-free substance, not less than fifty (50) per cent of butter fat.

f. MISCELLANEOUS MILK PRODUCTS.

Definition.

1. Ice cream (In preparation).

Standard.

Standard ice cream (In preparation).

Definitions.

- 2. Whey is the product remaining after the removal of fat and casein from milk in the process of cheese making.
- 3. Kumiss is mare's or cow's milk, with or without the addition of sugar (sucrose), which has undergone alcoholic fermentation.

II. VEGETABLE PRODUCTS.

A. GRAIN PRODUCTS.

(Schedule in preparation.)

B. FRUITS AND VEGETABLES.

(Schedule in preparation.)

C. SUGARS AND RELATED SUBSTANCES.

a. SUGAR AND SUGAR PRODUCTS.

Definition.

1. Sugar is the product chemically known as sucrose (saccharose) chiefly obtained from sugar cane, sugar beets, sorghum, maple, or palm.

Standard.

Standard sugar is white sugar containing at least ninety-nine and five-tenths (99.5) per cent of sucrose.

Definitions.

- 2. Granulated, loaf, cut, milled, and powdered sugars are different forms of standard sugars.
- 3. Maple sugar is the solid product resulting from the evaporation of maple sap.
- 4. Massecuite, melada, mush sugar, and concrete are products obtained by evaporating the purified juice of a sugar-producing plant, or a solution of sugar, to a solid or semi-solid consistence in which the sugar chiefly exists in a crystalline state.
- 5. Molasses is the product left after separating the sugar from massecuite, melada, mush sugar, or concrete.

Standard.

Standard molasses is molasses containing not more than twenty-five (25) per cent of water nor more than five (5) per cent of ash.

Definitions.

- 6. Sirup is the product obtained by purifying and evaporating the juice of a sugar-producing plant without removing any of the sugar.
- 7. Sugar-cane sirup is a sirup obtained by the evaporation of the juice of the sugar cane or by the solution of sugar-cane concrete.
- 8. Sorghum sirup is a sirup obtained by the evaporation of sorghum juice or by the solution of sorghum concrete.
- 9. Maple sirup is a sirup obtained by the evaporation of maple sap or by the solution of maple concrete.
- 10. Sugar sirup is a product obtained by dissolving sugar to the consistence of a sirup.

Standard.

Standard sirup is a sirup containing not more than thirty (30) per cent of water nor more than two and five-tenths (2.5) per cent of ash.

b. GLUCOSE PRODUCTS.

Definition.

1. Starch sugar or grape sugar is the solid product obtained by hydrely ling starch or a starch-containing substance until the greater part of the starch is

converted into dextrose. Starch sugar or grape sugar appears in commerce in two forms, anhydrous and hydrous. In the former, the sugar is crystallized without water of crystallization; in the latter, it is crystallized with water of crystallization. The hydrous varieties are commonly known as 70 and 80 sugars; 70 sugar is also known as brewers' sugar, and 80 sugar as climax or acme sugar.

Standards.

- (a) Standard 70 sugar or brewers' sugar is hydrous starch sugar containing not less than seventy (70) per cent of dextrose and not more than eight-tenths (0.8) per cent of ash.
- (b) Standard 80 sugar, elimax or aeme sugar, is hydrous starch sugar containing not less than eighty (80) per cent of dextrose and not more than one and one-half (1.5) per cent of ash.
- (c) Standard anhydrous grape sugar is anhydrous grape sugar containing not less than ninety-five (95) per cent of dextrose without water of crystallization and not more than eight-tenths (0.8) per cent of ash.

The ash of these standard products consists almost entirely of chlorids and sulphates of lime and soda.

Definition.

2. Glucose, mixing glucose, or confectioners' glucose is a thick sirupy substance obtained by incompletely hydrolizing starch or a starch-containing substance, decolorizing and evaporating the product. It is found in various degrees of concentration, ranging from forty-one (41) to forty-five (45) degrees Baumé.

Standard.

Standard glucose, mixing glucose, or confectioners' glucose is colorless glucose, varying in density between forty-one (41) and forty-five (45) degrees Baumé, at a temperature of one hundred (100) degrees F. (37.7° C.). It conforms in density, within these limits, to the degree Baumé it is claimed to show, and for a density of forty-one (41) degrees Baumé contains not more than twenty-one (21) per cent of water and for a density of forty-five (45) degrees not more than fourteen (14) per cent. It contains on a basis of forty-one (41) degrees Baumé not more than one (1) per cent of ash, consisting chiefly of chlorids and sulphates of lime and soda.

Definition.

3. Glucose sirup or corn sirup is glucose unmixed or mixed with sirup or molasses.

Standard.

Standard glucose sirup or corn sirup is glucose sirup or corn sirup containing not more than twenty-five (25) per cent of water nor more than three (3) per cent of ash.

c. CANDY.

Definition.

1. Candy is a product prepared from a saccharine substance or substances, with or without the addition of harmless coloring, flavoring, or filling materials.

Standard.

2. Standard candy is candy containing no terra alba, barytes, tale, chrome yellow, or other mineral substances or poisonous colors or flavors or other ingredients injurious to health.

D. HONEY.

(Schedule in preparation.)

D. CONDIMENTS (EXCEPT VINEGAR).

a. SPICES.

General Definition.

1. Spices are aromatic vegetable substances used for the seasoning of food.

General Standard.

Standard spices are sound spices, true to name, from which no portion of any volatile oil or other flavoring principle has been removed.

Definition.

2. Allspice or pimento is the dried fruit of Pimenta officinalis Lindl.

Standard.

Standard allspice is allspice containing not less than eight (8) per cent of quercitannic acid; 1 not more than six (6) per cent of total ash; not more than five-tenths (0.5) per cent of ash insoluble in hydrochloric acid, and not more than twenty-five (25) per cent of crude fiber.

Definitions.

- 3. Anise is the fruit of Pimpinella anisum L.
- 4. Bay leaf is the dried leaves of Laurus nobilis L.
- 5. Capers are the flower buds of Capparis spinosa L.
- 6. Caraway is the fruit of Carum carui L.

CAYENNE AND RED PEPPERS.

- 7. Red pepper is the red, dried, ripe fruit of any species of Capsicum.
- 8. Cayenne pepper or cayenne is the dried, ripe fruit of Capsicum fastigiatum DC., Capsicum frutescens L., Capsicum baccatum L., or some other small-fruited species of Capsicum.

Standard.

Standard cayenne pepper is cayenne pepper containing not less than fifteen (15) per cent of nonvolatile ether extract; not more than six and five-tenths (6.5) per cent of total ash; not more than five-tenths (0.5) per cent of ash insoluble in hydrochloric acid; not more than one and five-tenths (1.5) per cent of starch by the diastase method, and not more than twenty-eight (28) per cent of crude fiber.

Definitions.

- 9. Celery seed is the dried seed of Apium graveolens L.
- 10. Cinnamon is the dried bark of any species of the genus Cinnamonum from which the outer layers may or may not have been removed.
 - 11. True cinnamon is the dried inner bark of Cinnamonum zeylamicum Brevne.
- 12. Cassia is the dried bark of various species of Cinnamomum, other than Cinnamomum zeylanicum, from which the outer layers may or may not have been removed.
 - 13. Cassia buds are the dried immature fruit of species of Cinnamomum.
- 14. Ground cinnamon or ground cassia is a powder consisting of cinnamon, cassia or cassia buds, or a mixture of these spices.

Calculated from the total oxygen absorbed by the aqueous extract

Standard.

Standard cinnamon or cassia is cinnamon or cassia containing not more than eight (8) per cent of total ash and not more than two (2) per cent of sand.

Definition.

15. Cloves are the dried flower buds of Eugenia caryophyllata, Thunb. (Caryophyllus aromaticus L.) which contain not more than five (5) per cent of clove stems.

Standard.

Standard cloves are cloves containing not less than ten (10) per cent of volatile ether extract; not less than twelve (12) per cent of quercitannic acid; not more than eight (8) per cent of total ash; not more than five-tenths (0.5) per cent of ash insoluble in hydrochloric acid, and not more than ten (10) per cent of crude fiber.

Definitions.

- 16. Coriander is the dried fruit of Coriandrum sativum L.
- 17. Cumin seed is the fruit of Cuminum cyminum L.
- 18. Dill seed is the fruit of Peucedanum graveolens Benth & Hook.
- 19. Fennel is the fruit of Foeniculum vulgare Gaertn.
- 20. Ginger is the washed and dried, or decorticated and dried, rhizome of Zingiber officinale Roscoe.

Standard.

Standard ginger is ground or whole ginger containing not less than forty-two (42) nor more than forty-six (46) per cent of starch by direct inversion, not more than eight (8) per cent of crude fiber, not more than eight per cent of total ash, not more than one (1) per cent of lime, and not more than three (3) per cent of ash insoluble in hydrochloric acid.

Definition.

21. Limed or bleached ginger is whole ginger coated with carbonate of lime.

Standard.

Standard limed or bleached ginger is limed or bleached ginger containing not more than ten (10) per cent of ash, not more than four (4) per cent of carbonate of lime, and conforming in other respects to standard ginger.

Definition.

22. Horse-radish is the root of Cochlearia armoracia L.

Standard.

Standard grated or ground horse-radish may be mixed with vinegar.

Definition.

23. Mace is the dried arillus of Myristica fragrans Houttuyn.

Standard.

Standard mace is mace containing not less than twenty (20) nor more than thirty (30) per cent of nonvolatile ether extract, not more than three (3) per cent of total ash, not more than five-tenths (0.5) per cent of ash insoluble in hydrochloric acid, and not more than ten (10) per cent of crude fiber.

¹ Calculated from the total oxygen absorbed by the aqueous extract.

² Copper-reducing matters by direct inversion calculated as starch.

Definitions.

- 24. Macassar or Papua mace is the dried arillus of Myristica argentea Warb.
- 25. Bombay mace is the dried arillus of Myristica malabarica Lamarck.
- 26. Marjoram is the leaves, flowers, and branches of Origanum majorana L.
- 27. Mustard seed is the seed of Sinapis alba L. (white mustard), Brassica nigra Koch (black mustard), or Brassica juncea Coss. (black or brown mustard).
- 28. Ground mustard is a powder made from mustard seed, with or without the removal of the hulls and a portion of the fixed oil.

Standard.

Standard ground mustard is mustard containing not more than two and fivetenths (2.5) per cent of starch by the diastase method and not more than eight (8) per cent of total ash.

Definition.

29. Nutneg is the dried seed of Myristica fragrans Houttuyn, deprived of its testa and with or without a thin coating of lime.

Standard.

Standard nutmegs, ground or unground, are nutmegs containing not less than twenty-five (25) per cent of nonvolatile ether extract; not more than five (5) per cent of total ash; not more than five-tenths (0.5) per cent of ash soluble in hydrochloric acid, and not more than ten (10) per cent of crude fiber.

Definitions.

- 30. Macassar, Papua, male, or long nutmeg is the dried seed of Myristica argentea Warb. deprived of its testa.
- 31. Paprica is the dried ripe fruit of Capsicum annuum L., Capsicum longum DC., or some other large-fruited species of Capsicum.

PEPPER.

32. Black pepper is the dried immature berries of Piper nigrum L.

Standard.

Standard black pepper is black pepper free from added pepper shells, pepper dust, and other pepper by-products and containing not less than six (6) per cent of nonvolatile ether extract; not less than twenty-two (22) per cent of starch by the diastase method; not less than twenty-eight (28) per cent of starch by direct inversion, not more than seven (7) per cent of total ash; not more than two (2) per cent of ash insoluble in hydrochloric acid, and not more than fifteen (15) per cent of crude fiber. One hundred parts of the nonvolatile ether extract contain not less than three and one quarter (3.25) parts of nitrogen.

- 33. Long pepper is the dried fruit of Piper longum L.
- 34. White pepper is the dried mature berries of Piper nigrum L., from which the outer coating, or the outer and inner coatings, have been removed.

Standard.

Standard white pepper is white pepper containing not less than six [6] per cent of nonvolatile ether extract; not less than fifty-three (53) per cent of starch by the diastase method; not less that forty (40) per cent of starch by direct inversion; not less than four (4) per cent of total ash; not more than five-

¹ Copper reducing matters by direct inversion calculated as starch

tenths (0.5) per cent of ash insoluble in hydrochloric acid, and not more than five (5) per cent of crude fiber. One hundred parts of the nonvolatile ether extract contain not less than four (4) parts of nitrogen.

35. Saffron is the dried stigmas of Crocus sativus L.

36. Sage is the leaves of Salvia officinalis L.

- 37. Savory, or summer savory is the leaves, blossoms, and branches of Satureia hortensis L.
 - 38. Thyme is the leaves and ends of blooming branches of Thymus vulgaris L.

b. FRUIT EXTRACTS.

(Schedule in preparation.)

c. SALAD OILS.

(Schedule in preparation.)

d. SALT.

(Schedule in preparation.)

E. BEVERAGES (AND VINEGAR).

a. TEA.

(Schedule in preparation.)

b. coffee.

(Schedule in preparation.)

C. COCOA AND COCOA PRODUCTS.

Definitions.

- 1. Cocoa beans are the seeds of the cacao tree, Theobroma cacao L.
- 2. Cocoa nibs, or cracked cocoa is the roasted, broken cocoa bean freed from its shell or husk.
- 3. Chocolate, plain or bitter, chocolate liquor, is the solid or plastic mass obtained by grinding cocoa nibs without the removal of fat or other constituents except the germ.

Standard.

Standard chocolate is chocolate containing not more than three (3) per cent of ash insoluble in water, three and fifty hundredths (3.50) per cent of crude fiber and nine (9) per cent of starch nor less than forty-five (45) per cent of cocoa fat.

Definition.

4. Sweet chocolate and chocolate coatings are plain chocolate mixed with sugar, (sucrose), with or without the addition of cocoa butter, spices, or other flavoring materials.

Standard.

Standard sweet chocolate and standard chocolate coating are sweet chocolate and chocolate coating containing in the sugar—and fat—free residue no higher percentage of either ash, fiber, or starch than is found in the sugar—and fat—free residue or plain chocolate.

Definition.

5. Cocoa or powdered cocoa is cocoa nibs, with or without the germ, deprived of a portion of its fat and finely pulverized.

Standard.

Standard cocoa is cocoa containing percentages of ash, crude fiber, and starch corresponding to those in chocolate after correction for fat removed.

Definition.

6. Sweet or sweetened cocoa is cocoa mixed with sugar (sucrose).

Standard.

Standard sweet cocoa is sweet cocoa containing not more than sixty (60) per cent of sugar (sucrose) and in the sugar—and fat—free residue no higher percentage of either ash, crude fiber or starch than is found in the sugar—and fat—free residue of plain chocolate.

d. FRUIT JUICES-FRESH, SWEET, AND FERMENTED.

(In preparation.)

e. VINEGAR.

(In preparation.)

f. MEAD, ROOT BEER, ETC.

g. MALT LIQUORS.

(In preparation.)

h. SPIRITUOUS LIQUORS.

(In preparation.)

i. CARBONATED WATERS, ETC.

III. PRESERVATIVES AND COLORING MATTERS.

(In preparation.)

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